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STORAGE PLANT TO PRESERVE BY NATURE

Filed Feb. 19, 1926

2 Sheets-Sheet 1

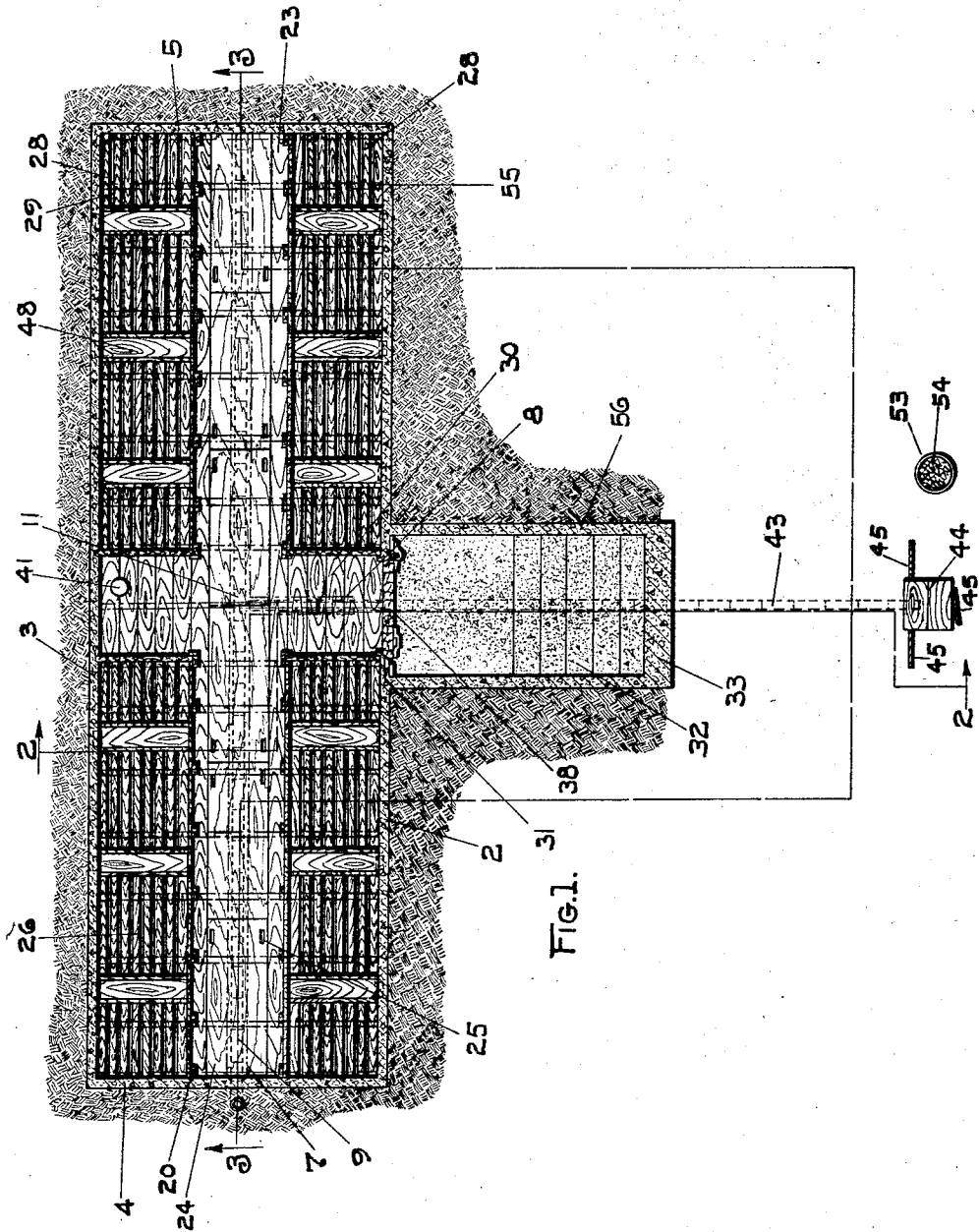


FIG. 1.

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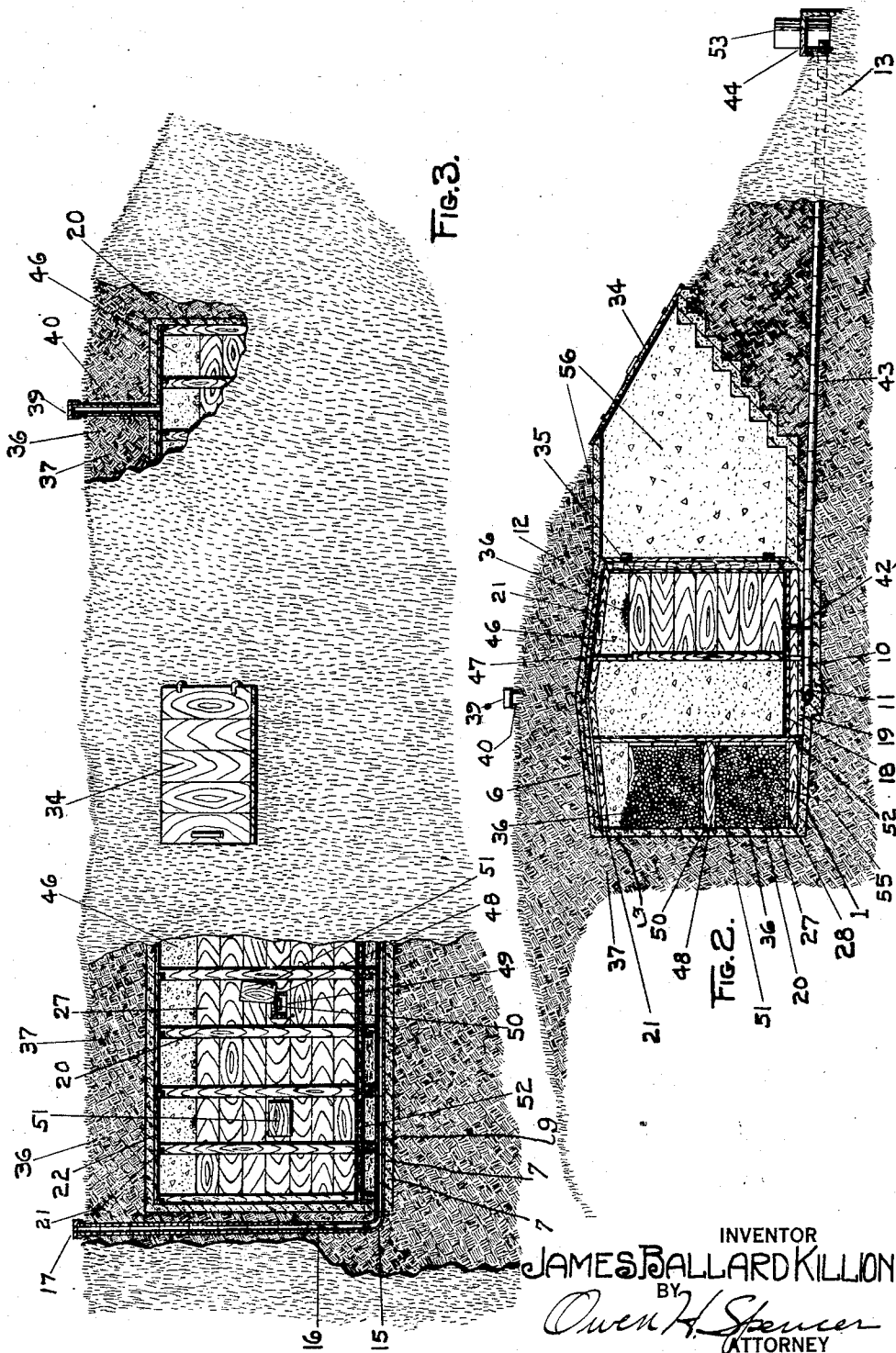
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE.

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STORAGE PLANT TO PRESERVE BY NATURE.

Application filed February 19, 1926. Serial No. 89,355.

My invention relates to means for preserving and storing potatoes; and more particularly to means for preserving young and tender potatoes to prevent the physical ageing of same; and consists substantially in the construction, combination and arrangement of parts hereinafter set forth and pointed out more particularly in the claims.

An object of my invention is to provide means which serves to retain the original status or condition of new and tender potatoes by true elements of nature.

It is a primary object of my invention to provide a means to prevent the changing of condition in young potatoes and thus prolong the tender qualities and flavor.

It is also an object of my invention to provide the consumer in temperate climates a means to retain young potatoes where same could not be kept in the open, on account of injurious cold weather and at the same time protect same from growthcausing warm weather.

The above and other objects are attained by the structure illustrated in the accompanying drawings in which Figure 1 is a sectional plan view and compares to the floor plan of an architectural drawing; Fig. 2 is a cross sectional view taken in the proximity of line 2—2 of Fig. 1 and Fig. 3 is a front elevation being in part an interior sectional view fragmentarily taken in the proximity of line 3—3 of Fig. 1.

Similar characters of reference designate similar parts thruout the several views. The main structure consists of the concrete floor 1 and the concrete walls 2, 3, 4 and 5, formed thereon, and covered by a roof type concrete wall 6. A longitudinally arranged channel 7 is formed along a medial line of the concrete floor 1, said floor being constructed to slope slightly towards said channel from both the front and rear sides 2 and 3, respectively. At a medial point of said concrete floor, a tributary transverse channel 8 communicates transversely with said longitudinal channel and extends forwardly from same.

Along in the longitudinal channel 7, are loosely placed in end-to-end relationship, a strand of ordinary porous drainage tiles 9, such as are used for draining farmland. This tile strand is communicated at the junction of said channels with the tributary strand of tiles 10 by a T style tile 11.

The structure as a whole is buried in, or near the crest of a hill 12 and the tributary strand of tiles 10 extends forwardly and in the direction of the downward slope of said hill, by which arrangement tile added in continuation of said tributary strand may thus be extended some distance, along thru the ground and protrude above the surface at a lower point 13 on the slope of the hill.

At one end of the structure as a whole, the longitudinal channel 7 ends abruptly at the end wall 5, the end tile 14 loosely embracing said end wall. The corresponding tile at the other end wall 4 extends thru same and communicates with an upwardly pointing elbow tile 15 with which is secured and communicated, the vertically arranged strand of tile 16. This vertical strand extends out above the surface of the ground and is normally closed by means of the removable cap 17, as will be understood.

A short distance above the concrete floor 1, a wooden floor 18 is constructed, considerable air space 19 being left between the two said floors.

Two rows of vertical studs 20 are provided, said rows being arranged longitudinally thru the interior structure. The lower ends of said studs rest directly on the concrete floor 1 and the upper ends embrace the concrete roof wall 6. Joists for supporting the wooden floor 18 are arranged transversely to the structure as a whole, and are secured to said studs directly under said wooden floor in conventional manner. The outer ends of said joists rest directly on the concrete floor 1, the above mentioned sloping characteristics of said concrete floor making same high enough at its extreme frontward and rearward edges to thus directly support said joists.

Closely under the concrete roof wall 6, the rafter type members 21 are provided to steady the ends of the studs 20, and to support the roof shaped form 22, upon which is poured the soft concrete in constructing said roof wall, as will be understood by those familiar with the art.

Between the two rows of studs 20 is the longitudinally arranged walk way 23, which is constructed of substantially air tight floor-

ing over the channels 7 and 8. Removable floor sections 24 are provided directly over the longitudinal channel 7, along thruout the full length of said walk way and being adapted to be normally removed by the hand grasp depressions 25 serve to give access to the tile of the strands 9 and 10, as well as the floor 1, and said channels for cleaning and other purposes.

On each side of said walk way are placed the potato bins 26, by which arrangement the studs 20 serve to support the longitudinal walls 27 of said bins in conventional manner.

The flooring directly under said bins is constructed of the closely arranged slats 28 which have slight air gaps 29 between same. By this arrangement a natural draft action causes air and moisture to normally rise up thru said bins, the purpose of which will be more clearly understood.

A transversely arranged walk way 30 is also provided to cross said longitudinal walk way at a medial point of the structure, said transverse walk way extending from the interior of the structure thru the inner door way 31 and thence to the steps 32, which lead upwardly to the exterior landing 33, at which is conveniently provided the old style reclining cellar outer door 34.

Removable end boards 35 are provided in the potato bins 26 on both sides of the transverse walk way 30, as will be more clearly understood, by which arrangement one may walk up into said bins from the inner ends thereof, for cleaning and placing potatoes 36 therein, as desired.

The concrete walls 2, 3, 4 and 5, the concrete floor 1 and the concrete roof wall 6, all have rough untroweled surfaces and are of suitable thickness and quality to slowly filter moisture from the surrounding earth 37 to the interior of the structure. This ordinarily supplies the inside atmosphere with proper moisture to prevent the potatoes 36 from becoming dry, and thus from reaching the state of old potatoes. Said surrounding earth ordinarily keeps the interior warm during normal winter months and thus prevents a condition of temperature which would cause the potatoes to sprout or ferment. In warmer months, this earth also protects the interior from sun warmth which would be destructive by causing the potatoes to sprout or decay or both.

The inner door 38 and the outer door 34 together normally prevent light or outside temperature from entering the interior, said inner door being a substantially air tight closure of refrigerator type.

Foul or old air may be liberated as needed by opening said doors for very short periods of time, although the cap 39 of the ventilator pipe 40 may be removed for this purpose when desired, said ventilator pipe serving to communicate the interior with

the outer atmosphere thru the roof wall 6, and the adjacent earth, in chimney manner. Said ventilator is more especially used, however, to liberate fumes from heating means, such as an oil stove 41 or the like, as used to assist in warming the interior in exceedingly cold climates, such as experienced in the State of Montana, where there is seldom any thawing weather thruout the winter season.

A shutter 42 is provided to be normally kept between two adjacent tiles of the tributary strand 10. During the warmer winter weather, as would occur for example in the State of Indiana, this shutter is withdrawn a short time during the night, thru which cool dew or frost laden air enters the interior thru the protruding tile 43 on the strand 10. Under ordinary conditions however, the shutter 42 is always in closed position during the day to prevent the dry or sun warmed air from entering the interior of the structure.

In admitting air as above mentioned thru the tributary strand 10, the wind might not be blowing in a direction to force or allow air to enter the protruding tile 43, and having this in mind, I have provided a box like inclosure 44 for said protruding tile. This structure has doors 45 on the different sides and it will be advantageous to open whichever one of these doors that would open against the wind current. This will greatly stimulate the movement of fresh air into the interior. It is understood, however, that any other means of forcing air in thru the tributary tile strand 10 may be used without departing from the scope of this invention.

Dry weather or other conditions may at times cause the inside atmosphere to become so dry as to cause the potatoes to dry out, due to the lack of moisture in the surrounding earth 37 and moisture is then supplied by removing the cap 17 from the vertical tile strand 16 and pouring a small amount of water in same, said cap being immediately closed again. The water which is thus supplied runs along thru the longitudinal tile strand 9, which being only loosely arranged permits water to run along in the corresponding channel 7.

In any event moisture admitted thru either the vertical tile strand 16 or the tributary strand 10, by means of the protruding tile 43, as above described, is gradually absorbed by the interior atmosphere and passes up between the slats 28 and thence upwardly thru the potatoes 36, keeping same always provided with fresh air of suitable moisture to prevent the skins of the potatoes from becoming tough and dry, and from consequently assuming an old potato flavor and texture. Where potatoes are dug and stored in the ordinary manner, the skins begin to

dry and get tough and the potato consequently loses its new potato flavor and tender qualities. This is the real and only distinguishing peculiarity between new and old potatoes, as commercially classified.

In using my invention the potatoes are preferably dug immediately after the first killing frost of the winter season, being also the period at which the young potatoes normally stop growing. At this period they are then dug and placed in the bins 26. I have accurately determined, after extensive trials, that these potatoes may be kept in this natural fresh and young state thruout the winter and into the late summer months, by properly controlling the conditions of the interior of the invention, as above described, preventing either fermentation, sprouting, shrinking or physical ageing of any kind or nature whatever.

During the extremely cold winter weather, freezing of the earth directly above the structure imparts a cold temperature to the roof wall 6. Considerable space 46 is therefore left between the top of the bins 26 and said roof wall, so that there is always considerable space between the potatoes and same, by which arrangement the potatoes are protected more perfectly from the injuriously cold weather temperature.

It will be obvious that during the very warmest winter and spring days, that the sun warmth on the earth directly above the structure would also be imparted to said roof wall, and the air space 46 will then protect the potatoes from destructibly warm weather.

The end walls of the potato bins 26 are constructed of horizontally arranged boards 35, which stand in vertical planes, being stacked one above the other in edge-to-edge relationship. As the bins are filled with potatoes the wall board are added and the potatoes themselves tend to hold the boards outwardly and firmly in place.

Grooves 47 are provided to loosely confine the ends of the end wall boards 35, by which arrangement they may be assembled or removed in wagon end gate manner.

About half way up the bin height at different places along the longitudinal walls 27 are inserted inverted trough like members 48. These members are arranged transversely to the structure as a whole and are extended into the bins 26 in drawer manner, thru suitable openings 49. The inner ends of said members are supported over the lugs 50 of the concrete walls 2 and 3 and the other ends are supported in the respective openings 49. Latch type closures 51 are provided to close said openings, as desired.

When the potatoes 36 are poured down over the members 48 considerable space is left thruout the interior of same, by which

manual access may be had to examine and inspect the potatoes by selection from within the bulk. Thermometers may be placed in the bins, by which the temperature of the potatoes may be ascertained, in the same manner.

One or more thermometers are also kept permanently in a conveniently accessible point in the walk ways so that the general temperature of the interior may be read, as desired. It is suggested that this temperature be kept at 30 to 50 degrees above zero.

As above mentioned, the floor sections 24 may be removed, as desired, although it is intended to have the walk way substantially air tight. In view of the fact that imperfections sometimes occur in wooden parts where the different pieces of floor material adjoin, I have provided a linoleum cover 52 as shown in Fig. 2, to run the full floor length of the longitudinal walk way 23, covering said removable floor sections and serving to make said walk way and the adjacent flooring more nearly air tight. By this arrangement all the air which arises from under the wooden floor 18 passes up thru the air spaces 19, thence upwardly thru the potatoes, as before indicated.

As aforementioned, considerable space 46 is left between the top of the bins 26 and the roof wall 6. This allows freedom of movement of air from the potatoes 36 as it passes thru same and out of the bins, by natural draft inclination.

A small oil stove 41 or other heating means is provided for use in the colder parts of the temperate zone for supplying heat artificially, when required. The ventilator pipe 40 is provided to allow fumes from such heating means to escape, as above indicated.

Regardless of whether artificial or natural means are used for keeping the inside atmosphere warm, moisture must be always provided, as above described, to prevent the potatoes from losing their sap thru their skins by evaporation. This is essential in view of the fact that potatoes are principally composed of starch and water and as sap is lost by evaporation, the potatoes lose the flavor desired in young potatoes.

A portable out door heating means 53 is sometimes used to warm or temper the undesirably cold air, which is to be introduced as before mentioned thru the tile strand 10. This heating means is moved as desired, depending upon direction of the wind; it being the object to have air which enters the protruding tile 43 to first blow past said out door heating means in which any ordinary stove fuel 54 may be used.

Moisture entering the interior of my invention as above mentioned either thru the different concrete walls or the vertical tile strand 16 gradually evaporates and is taken

up by the inside atmosphere, and a certain degree of coolness and freshness is thereby caused by this evaporation alone.

As, or before, the potatoes are placed in the bins 26, they are under most conditions sprinkled with water and then dusted with dry dirt, which clings to the wet potatoes and makes an earth coating for same. This assists to retain the sap within the potatoes. When potatoes are dug in extremely dry weather, or climates, they are puddled instead by dipping in a thin mud batter.

By trials I have found that I can arrest the growth of potatoes at an extremely early age. In one of these trials the doors 38 and 34 were left slightly ajar for a few weeks until some of the potatoes sprouted and developed several tiny new potatoes, about the size of garden peas and smaller. These were removed with the sprouts at the middle of the following winter, both the sprouts and these new potatoes were removed in the exact healthy premature growing state as if planted only a short time before. This demonstration proved conclusively that the status of potatoes cared for in my invention, does not change.

With the use of my invention vegetable growers may in climates such as in Indiana, grow two successive potato crops, of recognized early varieties. The last crop should be planted about the last part of July or the first part of August and dug directly after the first killing frost for storing.

Vertical headless pins 55 protrude from the joists of the wooden floor 18, in the air spaces 19, between the slats 28, which gives them the proper spacing, and at the same time, allows them to be readily removed for cleaning or other purposes.

The entrance walls 56 are conveniently constructed of concrete.

While I have illustrated in a general way, certain instrumentalities which may be employed in carrying my invention into effect, it is evident that many modifications may be made in the various details and dimensions, without departing from the scope of the appended claims, it being understood that my invention is not restricted to particular forms herein described; and is usually constructed of any suitable size to permit people to walk and work in same.

I claim:

1. A potato storage comprising an earth, enveloped structure having a storage room floor and an irrigating floor under same; an intermittently enclosed container serving to distribute water along under said storage room floor; a downwardly disposed vent conduit means communicating with said container and an upwardly disposed vent conduit above said storage room floor, cooperating with the first mentioned vent con-

duit means to circulate air over said water to absorb same and thus cool said storage by evaporation; and distributed openings for liberating the thus combined air and water along under said storage room floor.

2. A potato storage having a storage room floor and an irrigating floor under same; elevated bins for the potatoes, having ventilated bottoms in conjunction with said storage room floor thru which the atmosphere rises by natural draft action, said storage room floor being otherwise draft tight to concentrate the atmospheric movement thru said bottoms, an intermittently covered container serving to distribute water along under said storage room floor; a downwardly disposed vent conduit means communicating with said container; and an upwardly disposed vent conduit above said bins, cooperating with the first mentioned vent conduit means to circulate air over said water to absorb same and thus cool said storage by evaporation; and distributed openings in the upper portion of said container for discharging the thus combined air and water along under said storage floor.

3. A potato storage having a storage room floor and an irrigating floor under same; elevated bins for the potatoes, having ventilated bottoms in conjunction with said storage room floor thru which the atmosphere rises by natural draft action, said storage room floor being otherwise draft tight to concentrate the atmospheric movement thru said bottoms; substantially draft tight side walls for said bins, serving to cause atmospheric movement up thru said bins in the same manner that air passes up through a chimney; a container serving to distribute water along under said storage room floor; an enclosure serving to cover said container; a downwardly disposed vent conduit means communicating with said container and an upwardly disposed vent conduit above said bins, cooperating with the first mentioned vent conduit means to circulate air over said water to absorb same and thus cool said storage by evaporation; and openings in said enclosure through which the thus combined air and water is liberated and distributed along under said storage room floor.

4. A potato storage comprising an earth enveloped structure having a storage room floor and an irrigating floor under same; elevated bins for the potatoes, having ventilated bottoms in conjunction with said storage room floor thru which the atmosphere rises by natural draft action, said storage room floor being otherwise draft tight to concentrate the atmosphere movement thru said bottoms; and substantially draft tight side walls for said bins, serving to increase the atmospheric movement thru said bins in the same manner that a draft passes through a chimney.

5. A potato storage comprising an earth enveloped structure having porous walls thru which moisture absorbs to the atmosphere, within the storage, elevated bins for the potatoes, having substantially draft tight side walls, and bottoms with openings thru which the moistened atmosphere rises by natural draft action, in the same manner as air rises in a chimney to prevent the potatoes thus stored from drying out; a substantially air tight floor extending between said bins to concentrate the natural draft action thru said openings; removably inverted channels extending thru said side walls to within said bins for inspection of said potatoes and means to close access to said channels.

6. A potato storage having a storage floor and a sloping floor under said storage floor; loosely arranged porous tiles disposed along the lower portions of said sloping floor in loose end to end relationship; a vertical conduit communicating said tiles with the exterior, thru which water is supplied to said tiles; a drainage conduit means also communicating with said tiles which serves to admit outside air, over said water to enrich such air with moisture, and also serve as a drainage of surplus water from said channel means; elevated bins for the potatoes, having ventilated bottoms, forming a continuation to said storage floor, thru which the moisture enriched air arises by natural inclination from said tiles, said storage floor being draft tight between said bins to concentrate the normal upward air movement thru said bottoms; and substantially draft tight side walls for said bins, serving to cause the air movement up thru said floors, in the manner that air rises in a chimney.

7. A potato storage having a storage floor and an irrigating floor under said storage floor, said irrigating floor sloping to a channel means formed therein; loosely arranged porous tiles disposed within said channel means in loose end to end relationship; a vertical conduit communication between said tiles and the exterior, thru which water is supplied to said channel; a drainage conduit means also communicating with said tiles which serves to admit outside air, over said water to enrich such air with moisture, and also serve as a drainage of surplus water from said channel means; elevated bins for the potatoes having ventilated bottoms, forming a continuation to said storage floor, thru which the moisture enriched air arises by natural inclination from said tiles, said storage floor being otherwise draft tight to concentrate the normal upward air movement thru said bottoms; and substantially draft tight side walls for said bins, serving to increase the air movement thru said bottoms, in the manner that air rises in a chimney.

8. A potato storage having a storage floor and an irrigating floor under said storage floor, said irrigating floor sloping to a channel means formed therein; loosely arranged porous tiles disposed within said channel means in loose end to end relationship; a vertical conduit communication between said tiles and the exterior, thru which water is supplied to said channel means; a drainage conduit means also communicating with said tiles which serves to admit outside air, over said water to enrich such air with moisture, and also serve as a drainage of surplus water from said channel means; elevated bins for the potatoes having ventilated bottoms, forming a continuation to said storage floor, thru which the moisture enriched air arises by natural inclination from said tiles, said storage floor being otherwise draft tight to concentrate the normal upward air movement thru said bottoms; substantially draft tight side walls for said bins, serving to increase the air movement thru said bottoms like air is caused to pass upwardly through a chimney and a vent conduit disposed thru the upper wall portion of said storage to further increase the air movement thru said bins.

9. A potato storage comprising an earth enveloped structure having a storage room floor and an irrigating floor under same; elevated bins for the potatoes, having ventilated bottoms in conjunction with said storage room floor thru which the atmosphere rises by natural draft action, said storage room floor being otherwise draft tight to concentrate the atmospheric movement thru said bottoms.

10. A potato storage comprising an earth enveloped structure having porous walls thru which moisture absorbs to the atmosphere within the storage; elevated bins for the potatoes, having bottoms with openings thru which said atmosphere circulates by natural draft action, to prevent the potatoes thus stored from drying out; and a substantially air tight floor extending between said bins to concentrate the natural draft action thru the bottoms of said bins.

11. A potato storage comprising an earth enveloped structure having porous walls thru which moisture absorbs to the atmosphere within the storage; elevated bins for the potatoes, having slotted bottoms thru which said atmosphere circulates by natural draft action, to prevent the potatoes thus stored from drying out; a substantially air tight floor extending between said bins to concentrate the natural draft action thru the bottoms of said bins; substantially draft tight side walls for said bins; and inverted channels extending thru said side walls to within said bins for inspection of said potatoes.

12. A potato storage comprising an earth enveloped structure having porous walls

thru which moisture absorbs to the atmosphere within the storage; elevated bins for the potatoes, having ventilating bottoms thru which said atmosphere circulates by natural draft action, to prevent the potatoes thus stored from drying out; a substantially air tight floor extending between said bins to concentrate the natural draft action thru the bottoms of said bins; substantially draft tight side walls for said bins; inverted channels extending thru said side walls to within said bins for inspection of said potatoes; and means to close access to said channel.

In testimony whereof, I have hereunto set my hand on this the 17th day of February, 1926, A. D.

JAMES BALLARD KILLION